Assuming that this time interval correspods to an induction period, it may be related to the concentration of hydrochloroauric acid by the equation,

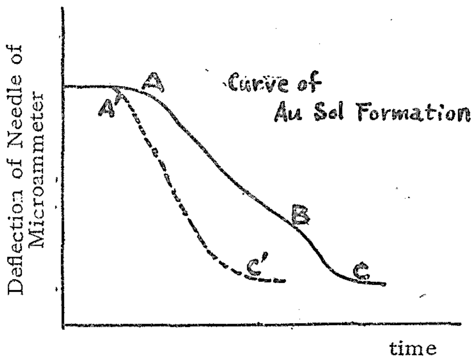
$$\tau = K\,A^{3/2} + C, \text{ (constant temperature)}$$

where $\tau$ is the induction period, $A$ the initial concentration of the auric acid solution, and $K$ and $C$ are constants.

Another expression relating to the concentration of hydroxide will be written in the form,

$$\tau' = -K'\,B + C', \text{ (const. temp.)}$$

where $\tau'$ is the induction period, $B$ the initial concentration of hydrogen peroxide, and $K'$ and $C'$ are constants.




Furthermore, from the temperature coefficient of $\tau'$ the energy for activation was determined as 9200 cal./mole.

Although the reaction mechanism is not clear, it may be considered that hydrochloroauric acid in the induction period may play an effective role.

The authors express their gratitude to Prof. Goto for his valuable advices.

---

## 19. Thermodynamic Properties of Higher Fatty Acids in Organic Solvents

Itsuro YAMAKITA and Hiroshi AIDA

(Goto Laboratroy)

The authors measured the distribution of higher fatty acids (palmitic, myristic and lauric acids) between two liquid layers made up of two slightly miscible organic solvents (cyclohexane–methanol) at various concentrations and temperatures.

The distribution ratio varies with the concentration of the solute at a given temperature and can be expressed by the following equation, which is derived from the assumption that fatty acid forms dimer besides monomer in the upper (cyclohexane) layer, but monomer only in the lower (methanol) layer:

$$C_1/C_2 = k_1 + (2k_1^2/k_2).\ C_2$$

where $C_1$ and $C_2$ are the concentration of fatty acid in the upper and lower layers respectively, $k_1$ is the distribution constant of monomer in the upper and lower layers, and $k_2$ is the dissociation constant of dimer into monomer in the upper layer.

From the values of $k_1$ and $k_2$ and their variation with temperature, free energy change ($\triangle F$), enthalpy change ($\triangle H$) and entropy change ($\triangle S$) were calculated by the ordinary thermodynamic treatment. The results obtained are given in the next table.

| | Temp. °C | $k_1$ | | | $k_2$ | | |
|---|---|---|---|---|---|---|---|
| | | $\triangle F$ cal./mole | $\triangle H$ cal./mole | $\triangle S$ cal./mole, deg. | $\triangle F$ cal./mole | $\triangle H$ cal./mole | $\triangle S$ cal./mole, deg. |
| | 25 | 220 | | | 930 | | |
| Palmitic acid | 10 | 290 | 1810 | 4.9 | 1230 | 6990 | 22.1 |
| | 0 | 330 | | | 1460 | | |
| | 25 | 360 | | | 1010 | | |
| Myristic acid | 10 | 420 | 1890 | 5.2 | 1300 | 7230 | 21.6 |
| | 0 | 470 | | | 1520 | | |
| | 25 | 520 | | | 1170 | | |
| Lauric acid | 10 | 620 | 2167 | 5.5 | 1470 | 7380 | 20.9 |
| | 0 | 660 | | | 1680 | | |

## 20. Protecting Methods against Blistering on Galvanized Steel Plate

Hiroshi SAWAMURA and Taiji OGINO

(Sawamura Laboratory)

Many investigators have observed that the blistering on the galvanized steel plate is caused by the hydrogen absorbed during acid pickling before hot galvanizing. So, it is important to know the behavior of the hydrogen in the steel plate during and after acid pickling for the protection of blistering. The authors have investigated the absorption and the evolution of hydrogen in the steel plates by sulphuric acid pickling under various conditions.

Steel plates used for these experiments have 0.5 mm. thickness and following chemical composition: C, 0.06%; Si, 0.12%; Mn, 0.38%; P, 0.057%; S, 0.025%; and $H_2$, 1.6 cc./100 gr Fe. Determination of hydrogen in steel plate is performed in conformity to the "vacuum heat extraction method" established by "Gakushin", except that the Orsat's apparatus is replaced by Ambler's for gas analysis and extraction temperature is raised to 900°C.